

Kelly

Air Force Base

Installation Restoration Program



RISK ASSESSMENT FACT SHEET

JULY 1999

A fact sheet providing information about the EPA risk assessment process used at Kelly Air Force

The purpose of this fact sheet is to define and describe the processes used in determining risk at hazardous waste sites. The process by which risk is determined is based on Environmental Protection Agency (EPA) standards.

DEFINING RISK ASSESSMENT

Risk assessments provide a scientific basis for the estimation of cancer and non-cancer risks associated with exposure to a contaminated site.

The Human Health Risk Assessment (HHRA) evaluates the likelihood that people working at, living near or visiting Kelly Air Force Base could have an increased risk of developing health problems (both cancer and non-cancer) as a result of exposure to hazardous substances potentially related to Kelly AFB.

For cancer health risks, the estimate of risk is presented as a probability that a person will develop cancer over a lifetime of exposure to chemicals present at Kelly AFB. Non-cancer health risks are estimated by comparing the predicted level of exposure to toxicity values, which are exposure levels that federal agencies believe to be safe.

DETERMINING RISK

When determining the human health risks at any hazardous waste site, EPA makes certain basic assumptions:

- A person will live 70 years and be exposed to the chemical over a 30-year period.
- The average adult weighs 154 pounds and drinks 2.1 quarts of water per day.

The study method is conservative, meaning that the assumptions are somewhat overestimated in order to represent the most reasonable maximum exposure. Therefore, the risk assessment often present higher risks than the probable actual occurrence of adverse health effects.

BASELINE RISK ASSESSMENT PROCESS

EPA uses the same risk assessment process at all hazardous waste sites to identify potential risks. The risk assessment process will identify the risks associated with the site through the collection of specific data, an assessment of the probability of exposure and an assessment of the toxicity associated with the contaminants found on site.

The first step of the risk assessment, called *site characterization*, begins with data collection and evaluation. Site descriptions, including past activities at the site, are evaluated to understand what types of chemicals can be expected at the site. Samples of groundwater, soil, surface water, sediment and aquatic animals are obtained from the site and analyzed. This determines what chemicals are present, their locations, and if their concentrations exceed health-based screening levels. Chemicals that exceed these screening levels are evaluated in the remaining steps of the risk assessment.

The *exposure assessment* portion of the risk assessment uses this data to identify:

- Exposure pathways, such as drinking contaminated groundwater or skin absorption of contaminated groundwater
- People most likely to come in contact with site contaminants
- Quantity of a contaminant to which people could be exposed without any adverse health effects

The *toxicity assessment* portion of the risk assessment evaluates the chemical properties of the contaminant's found in the data collection phase. It also identifies the health effects associated with a given contaminant. The health effects may be carcinogenic (cancer-causing) or non-carcinogenic. The combination of the exposure assessment and the toxicity assessment are the basis for the risk characterization.

The *risk characterization* is the complete evaluation of the risks to human health associated with the levels of contamination and the exposure pathways at the site.

The risk characterization:

- Quantifies the potential for adverse health effects
- Discusses uncertainties associated with the results
- Provides the basis for risk-based cleanup actions

For risk to exist, three components must be present:

- A source of contamination
- A pathway for contaminants to reach humans
- A population that could potentially be exposed

If any of the three components is missing, no risk can exist. The key component of any risk assessment is the amount of contaminant reaching the population, also known as *dose*. For any given dose, there are two general types of toxic response: carcinogenic and non-carcinogenic.

Studies indicate that for carcinogenic contaminants, there *is no* minimum dose below which no adverse health effects occur. As the dose decreases, the risk for cancer becomes smaller and smaller. Non-carcinogenic risks are calculated by assuming that there *is* a dose below which adverse health effects do not occur.

The risk characterization results are often expressed in shorthand fashion as a risk number. For cancer risk estimates, the risk number is the probability of the occurrence of additional cancer cases above the cancer incidence in the general population. For example, an estimate for chemical X might be given as one in a million and is sometimes represented by the decimal equivalent. The American Cancer Society statistics show the cancer rate in the general population is one in three over a lifetime.

For non-cancer effects, such as nerve or kidney damage, risk estimates are typically not given as a probability that a particular effect will occur, but rather an estimate of the level of exposure that would not be expected to cause harm. The estimate is called a reference dose and is usually expressed in terms of milligrams (of chemical) per kilogram of body weight per day, for example, 0.02 mg/kg-day. Exposure to a chemical below its reference dose would not be expected to result in negative health effects.

An important part of the risk characterization is a discussion of the uncertainties associated with the results. Risk estimates are based on a number of conservative assumptions. Therefore, the risk assessment often predicts higher risk than may be reasonably expected to occur.

Risk assessment has been demonstrated to be an effective means of prioritizing how scarce funding sources should be spent to provide the most benefit to human and ecological health.

WHAT A RISK ASSESSMENT DOES AND DOES NOT PROVIDE

DOES :

- Determine the potential for a site to pose a health threat
- Indicate which chemicals are most hazardous at the site
- Determine how people could come into contact with hazardous chemicals
- Identify problems at a site that need to be addressed
- Provide information useful for prioritizing clean-up activity among multiple areas of the site

DOES NOT:

- Determine whether any detectable health effects have occurred or will occur because of the site
- Identify individuals who are likely to have health problems because of a site

WHAT CAN I DO TO HELP?

- Provide any first-hand information you may have about contaminated sites
- Provide any information regarding activities that may have resulted in exposure to contaminants
- Share concerns about sites that are part of the cleanup process
- Participate in public forums such as the Restoration Advisory Board (RAB) and attend other important Kelly cleanup public meetings and functions

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